



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

---

**Date:** October 7, 2009

**In reply refer to:** A-09-112

The Honorable J. Randolph Babbitt  
Administrator  
Federal Aviation Administration  
Washington, DC 20591

---

On January 15, 2009, about 1527 eastern standard time,<sup>1</sup> US Airways flight 1549, an Airbus A320-214, registration N106US, ingested birds into both engines, lost engine thrust, and landed in the Hudson River following a takeoff from LaGuardia Airport (LGA), New York City, New York. The 150 passengers and 5 crewmembers aboard evacuated the aircraft successfully. One flight attendant and four passengers received serious injuries, and 95 passengers received minor injuries. The scheduled domestic passenger flight, operating under the provisions of 14 *Code of Federal Regulations* Part 121, was en route to Charlotte Douglas International Airport in Charlotte, North Carolina. An instrument flight rules flight plan was filed, and visual conditions prevailed.<sup>2</sup>

The National Transportation Safety Board's (NTSB) investigation of this accident is ongoing; however, preliminary findings indicate the need for a modification to radar data processing systems so that air traffic controllers can program those systems to designate a flight as being in an emergency situation. This designation causes radar data processing systems to display critical information about the flight, including its location, to other controllers. Aircraft experiencing an emergency are given air traffic control (ATC) priority over all other traffic. To provide the most effective assistance, it is imperative for all controllers to know the location of the affected aircraft to prevent aircraft conflicts and collisions.

Airport surveillance radar (ASR) systems track an aircraft by transmitting an interrogating pulse and receiving a transponder code from a transponder on the aircraft. The transponder code is a unique, 4-digit, identifier for the flight, assigned by ATC and programmed into the transponder by the pilot.<sup>3</sup> The automated radar terminal system (ARTS) processes the code from the aircraft and displays information about that aircraft to air traffic controllers.

---

<sup>1</sup> All times in this letter are eastern standard time based on a 24-hour clock.

<sup>2</sup> The preliminary report for this accident, National Transportation Safety Board identification number DCA09MA026, is online at <<http://www.nts.gov/ntsb/query.asp>>.

<sup>3</sup> The accident airplane was assigned transponder code 7134 for this flight, and it was using that code.

On air traffic controllers' displays, each aircraft's location is represented by a single-character position symbol, indicating which ATC sector is responsible for that aircraft. (For example, all aircraft controlled by the LGA departure ATC position are shown as "L"s.) For each aircraft, the ARTS also produces a data block, which contains the aircraft's type, altitude, ground speed, and unique call sign. Controllers usually program the ARTS to display data blocks for all aircraft directly under their control and for other aircraft that may affect their operations. On the day of the accident, LGA tower controllers had chosen to display data blocks for aircraft under the control of the tower and aircraft under the control of the approach and departure sectors immediately adjacent to LGA airspace. Other aircraft in the area were shown on the tower controllers' displays as position symbols only, without their associated data blocks.

Data blocks are also shown automatically for aircraft in particular situations, including aircraft that are transmitting the internationally recognized distress code, 7700. When a 7700 code is recognized by the ARTS processor, the associated flight's full data block, along with a flashing "EM" tag indicating emergency status, is forced onto the radar displays of all nearby controllers.

When the accident airplane departed LGA, its full data block was displayed to the LGA tower controllers. However, when the airplane was about 1/2 mile past the departure end of the runway, the departure controller, in keeping with standard practice, maintained responsibility for the airplane but transferred its information to the Liberty West position controller who would next handle the airplane. This controller's airspace was not immediately adjacent to LGA airspace. Thus, because of the display settings in use at LGA tower, the data block for the airplane disappeared from LGA tower radar displays. From that point on, the LGA tower radar displays showed only the position symbol for the airplane, with no call sign to identify it. Figures 1 and 2 show how the displays differed before and after the transfer.



Figure 1. Simulated tower radar display showing a full data block for an aircraft. Position symbol L indicates the location of the aircraft and that it is controlled by the LGA departure position. The aircraft is identified by its call sign, "AWE1549."



Figure 2. Simulated tower radar display showing the position symbol for the same aircraft after control transferred to the Liberty West position.

As soon as the pilot of the accident airplane advised the departure controller that he was returning to the airport for an emergency landing, the departure controller contacted the LGA tower controller and told him, "stop departures we got an emergency returning." He did not provide the call sign, type, or location of the aircraft that was declaring the emergency.

During interviews with NTSB investigators, the departure controller said that he did not provide a location for the accident airplane because it had just departed and he believed the full data block was still being displayed on the LGA controllers' radar displays. However, the LGA controllers said that they believed that location information had not been provided because the airplane was far from the airport. The LGA controllers were not able to locate the accident airplane on their displays until the ARTS displayed a "conflict alert" between the airplane and another aircraft, thus, causing the data blocks for both aircraft to be displayed.

Because the pilot of the accident airplane was attending to the loss of both engines, he did not switch the airplane's transponder to emergency code 7700 nor was he required to do so. When interviewed, the controller who had been in contact with the pilot at the time stated that he did not direct the pilot to change to code 7700 because he did not want to add to the pilot's workload.

As noted above, transponder code 7700 is used to distinguish aircraft experiencing emergencies from other aircraft, and if the crew of the accident airplane had set its transponder to that code, the ARTS processor would have forced the airplane's data onto all displays within range. However, changing the transponder setting would have required action from a crew already fully occupied in addressing a dual engine failure. Permitting a controller to change how ARTS processes the transponder code for aircraft experiencing an emergency would allow aircraft to be fully identified to all affected controllers without burdening the crew. More specifically, if the departure controller had been able to perform a keyboard entry that would instruct the ARTS processor to treat the airplane's transponder code (7134) like an emergency transponder code (7700), the data block information would have been immediately shown on all displays using that ARTS processor, regardless of existing display settings. Preliminary discussions with Federal Aviation Administration technical staff have indicated that the addition of such a function is feasible.

The NTSB notes that, although this accident occurred under control of an ARTS-equipped ATC facility, similar situations can occur in any radar facility, including those equipped with other radar data processing systems. These other systems would benefit from the same modification envisioned for the ARTS.

Therefore, the National Transportation Safety Board recommends the following to the Federal Aviation Administration:

Modify Federal Aviation Administration radar data processing systems so that air traffic controllers can instruct the systems to process the discrete transponder code of an aircraft experiencing an emergency as if it were an emergency transponder code. (A-09-112)

In response to the recommendation in this letter, please refer to Safety Recommendation A-09-112. If you would like to submit your response electronically rather than in hard copy, you may send it to the following e-mail address: [correspondence@ntsb.gov](mailto:correspondence@ntsb.gov). If your response includes attachments that exceed 5 megabytes, please e-mail us asking for instructions on how to use our secure mailbox. To avoid confusion, please use only one method of submission (that is, do not submit both an electronic copy and a hard copy of the same response letter).

Chairman HERSMAN, Vice Chairman HART, and Member SUMWALT concurred in this recommendation.

*[Original Signed]*

By: Deborah A.P. Hersman  
Chairman